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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/987,718	11/15/2001	Kazuyuki Nitta	2001-1703A	7678

513 7590 11/04/2003

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EXAMINER

SAGAR, KRIPA

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 11/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/987,718

Applicant(s)

NITTA ET AL.

Examiner

Kripa Sagar

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's affirmation of the election of claims 1-4 in paper #5 submitted 8/20/03 is acknowledged. Claims 1-4 are under consideration.

Double Patenting

2. The provisional double patenting rejection is overcome by the terminal disclaimer filed 8/20/03.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat. 6284438 to Choi et al. in view of US Pat. 6072006 to Bantu et al.

The instant claims recite a method of patterning holes in a photoresist and thermally reflowing the pattern. The resist composition is specified.

Choi (1;8-17;2) teaches a resist composition that is suitable for thermal reflow and a method of forming a hole pattern using a half-tone phase shift mask. The resist comprises a polymer that is acid labile making it more soluble in an alkaline solution, a photo-acid generator (PAG) and a basic amine. Choi teaches the steps of patterning a hole-pattern using a half-tone mask (HTM). The hole dimensions are reduced by thermal-flow (3;33-4;25). The reflow times and temperatures are similar to the instant

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claims (examples 6,7,8, cols. 14-15). The base polymer constitutes nearly 50- 90% (w/w) of the resist (3;65-4;9). The PAG (1-15% w/w) and amine (0.1-2% w/w) are within the range of the instant claims (4;18-26).

Choi does not teach a cross-linking agent comprising a divinyl ether group (cl.1,3,4).

Bantu (1;6-15;21) teaches that polyvinyl ethers form excellent cross-linking compounds, in a chemically amplified resist (CAR) containing polyhydroxystyrene base-polymers. (7;38-42). A preferred polyvinyl ether is cyclohexanedimethanol divinyl ether (CHDVE; 4;61).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a cross-linking compound as taught by Bantu with Choi's composition to form thermally reflowable resists because Bantu teaches that the degree of cross-linking and hence the thermal flow of the resist can be controlled by the type and amount of polyvinylether used (2;64-3;37).

Response to Arguments

5. Applicant's arguments filed 8/20/03 have been fully considered. The rejection based on Takemura is overcome by the declaration filed 8/20/03

Applicant's arguments concerning the rejection based on Choi in view of Bantu are not well founded.

Applicant has argued that Bantu does not teach a polydivinyl ether (as a crosslinking additive) in the *cited section* of the reference. This section of the rejection is reproduced below:

Bantu teaches that polyvinyl ethers form excellent cross-linking compounds, in a chemically amplified resist (CAR) containing polyhydroxystyrene base-polymers. (7;38-42). A preferred polyvinyl ether is cyclohexanedimethanol divinyl ether (CHDVE; 4;61). (Emphasis not in original).

As correctly pointed out by Applicant, Bantu refers solely to crosslinking polyhydroxystyrene base-polymer in 7;38-42 which is an element of the instant specification. **However the invention itself is directed to polyvinyl ether based crosslinking agents (2;48-52). The use of polyvinyl ether was pointed out in the very next sentence of the original rejection; and explicitly mentions CHDVE as a preferred polyvinyl ether in 4;61.** Applicant appears to have completely overlooked the teachings of Bantu.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

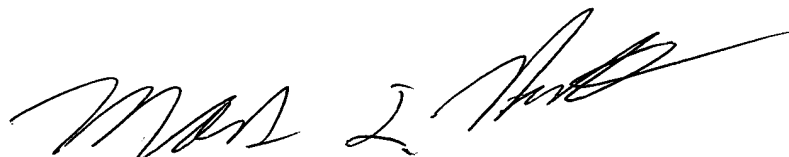
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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kripa Sagar whose telephone number is 703-605-4427. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on 703-308-2464. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

A handwritten signature in black ink, appearing to read 'Mark F. Huff', with a stylized flourish at the end.

MH/ks

MARK F. HUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700